

COUNTY OF SAN DIEGO

GUIDELINES FOR DETERMINING SIGNIFICANCE
AND
REPORT FORMAT AND CONTENT REQUIREMENTS

WILDLAND FIRE AND FIRE PROTECTION



LAND USE AND ENVIRONMENT GROUP

Department of Planning and Land Use
Department of Public Works

March 19, 2007

APPROVAL

I hereby certify that these **Guidelines for Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and were considered by the Director of Planning and Land Use, in coordination with the Director of Public Works on the 19th day of March, 2007.



GARY PRYOR
Director of Planning and Land Use



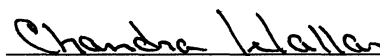
JOHN SNYDER
Director of Public Works



Attest: ERIC GIBSON
Deputy Director of Planning and Land Use

I hereby certify that these **Guidelines for Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection** are a part of the County of San Diego, Land Use and Environment Group's Guidelines for Determining Significance and Technical Report Format and Content Requirements and have hereby been approved by the Deputy Chief Administrative Officer (DCAO) of the Land Use and Environment Group on the 19th day of March, 2007. The Director of Planning and Land Use is authorized to approve revisions to these Guidelines for Determining Significance and Report Format and Content Requirements for Wildland Fire and Fire Protection, except any revisions to the Guidelines for Determining Significance presented in Chapter 4.0 must be approved by the DCAO.

Approved, March 19, 2007



CHANDRA WALLAR
Deputy CAO

COUNTY OF SAN DIEGO

GUIDELINES FOR DETERMINING SIGNIFICANCE

WILDLAND FIRE AND FIRE PROTECTION



LAND USE AND ENVIRONMENT GROUP

Department of Planning and Land Use
Department of Public Works

March 19, 2007

EXPLANATION

These Guidelines for Determining Significance for Wildland Fire and Fire Protection and information presented herein shall be used by County staff for the review of discretionary projects and environmental documents pursuant to the California Environmental Quality Act (CEQA). These Guidelines present a range of quantitative, qualitative, and performance levels for particular environmental effects. Normally, (in the absence of substantial evidence to the contrary), an affirmative response to any one Guideline will mean the project will result in a significant effect, whereas effects that do not meet any of the Guidelines will normally be determined to be “less than significant.” Section 15064(b) of the State CEQA Guidelines states:

“The determination whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on factual and scientific data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting.”

The intent of these Guidelines is to provide a consistent, objective and predictable evaluation of significant effects. These Guidelines are not binding on any decision-maker and do not substitute for the use of independent judgment to determine significance or the evaluation of evidence in the record. The County reserves the right to modify these Guidelines in the event of scientific discovery or alterations in factual data that may alter the common application of a Guideline.

LIST OF PREPARERS AND TECHNICAL REVIEWERS

County of San Diego

Jeff Murphy, DPLU, Primary Author
Paul Dawson, DPLU, Contributing Author
Ralph Steinhoff, DPLU, Technical Review
Ken Miller, DPLU, Technical Review

FPP Technical Review Panel

Bill Clayton, Division Chief, CDF
Robin Church, RC Biological Consulting
Rolland Crawford, Loma Linda Fire Department,
Co-Chair of the Wildland-Urban Interface
Committee, California Fire Chiefs Association,
Fire Prevention Officers Section
Scott Franklin, Scott Franklin Consulting
Jim Hollingsworth, Fire Marshall Ramona Fire
District
Jim Hunt, Hunt Research Corp.
Cliff Hunter, Rancho Santa Fe Fire District,
member of the ICC Wildland Committee
Dennis Moser, Moser Ventures Inc
Don Oaks, Author of Article 86 Uniform Fire Code,
Co-Chair of California Chief's Wildland
Committee
Thom Porter, Division Chief CDF Pre-Fire Division
Mike Scott, Rancho Santa Fe Fire District, Urban
Forester
Pete Scully, Battalion Chief CDF Border Division
Andy Vanderlaan, Former Executive Director
Western Fire Chief's Publishers of Uniform Fire
Code, Current Chair LAFCO

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
INTRODUCTION.....	1
1.0 GENERAL PRINCIPLES AND EXISTING CONDITIONS.....	2
1.1 <u>Wildland/Urban Interface</u>	2
1.2 <u>Wildfire Environment</u>	2
1.2.1 Weather.....	3
1.2.2 Fuel.....	4
1.2.3 Topography	5
1.3 <u>Wildland/Urban Interface Ignition Factors</u>	6
1.3.1 Conduction	7
1.3.2 Convection	7
1.3.3 Radiation.....	7
1.3.4 Firebrands	7
1.3.5 Flame Impingement	8
1.4 <u>Defensible Space</u>	8
1.5 <u>Defensible Structures</u>	8
1.6 <u>Fire Agencies</u>	9
1.7 <u>County Service Areas</u>	13
2.0 EXISTING REGULATIONS AND STANDARDS.....	14
2.1 <u>Federal Regulations and Nationally Recognized Standards</u>	14
2.1 <u>State Regulations and Standards</u>	15
2.2 <u>Local Regulations and Standards</u>	15
3.0 TYPICAL ADVERSE EFFECTS.....	16
4.0 GUIDELINES FOR DETERMINING SIGNIFICANCE	18
5.0 STANDARD MITIGATION AND PROJECT DESIGN CONSIDERATIONS.....	20
5.1 <u>Adequate Emergency Services</u>	20
5.1.1 Emergency Response.....	21
5.1.1.1 Applicable Code/Regulations	21
5.1.1.2 Applied Standards	21
5.2 <u>Emergency Access</u>	22
5.2.1 Emergency Access Required.....	22
5.2.1.1 Applicable Code/Regulations	22
5.2.1.2 Applied Standards	23
5.2.2 Road Width	25
5.2.2.1 Applicable Code/Regulations	25
5.2.2.2 Applied Standards	25
5.2.3 Grade.....	25
5.2.3.1 Applicable Code/Regulations	25

5.2.3.2	Applied Standards	25
5.2.4	Surface Type.....	26
5.2.4.1	Applicable Code/Regulations	26
5.2.4.2	Applied Standards	26
5.3	<u>Water</u>	27
5.3.1	Inside a Water District	27
5.3.1.1	Applicable Code/Regulations	27
5.3.1.2	Applied Standards	27
5.3.2	Outside a Water District	28
5.3.1.1	Applicable Code/Regulations	28
5.3.1.2	Applied Standards	29
5.4	<u>Ignition Resistive Building Construction and Fire Protection Systems</u>	29
5.4.1	Basic Ignition Resistant Construction	29
5.4.1.1	Applicable Code/Regulations	29
5.4.1.2	Applied Standards	29
5.4.2	Enhanced Ignition Resistant Construction.....	30
5.4.1.1	Applicable Code/Regulations	30
5.4.1.2	Applied Standards	31
5.5	<u>Defensible Space, Ornamental Landscaping and Vegetation Management</u>	30
5.5.1	Fuel Modification.....	31
5.5.1.1	Applicable Code/Regulations	31
5.5.1.2	Applied Standards	31
6.0	REFERENCES	33

LIST OF TABLES

Table

Table 1	Emergency Response Travel Times.....	21
Table 2	Water Storage Tank Requirements	28

LIST OF FIGURES

Figure

Figure 1	Climate Zones in San Diego County.....	39
Figure 2	Fuel Modification Zone/Limited Building Zone.....	8

LIST OF ATTACHMENTS

Attachment

Attachment A	Definitions.....	38
--------------	------------------	----

List of Acronyms

ALS	Advanced Life Support
AMR	American Medical Response
BLS	Basic Life Support
CBC	California Building Code
CCR	California Code of Regulations
CDF	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFC	County of San Diego Consolidated Fire Code
CSA	County Service Area
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
FAHJ	Fire Agency Having Jurisdiction
FPD	Fire Protection District
FPP	Fire Protection Plan
FMZ	Fuel Modification Zone
IAFC	International Association of Fire Chiefs
IPCC	Intergovernmental Panel on Climate Change
ISO	Insurance Services Office
LAFCO	Local Agency Formation Commission
LBZ	Limited Building Zone
MOU	Memorandum of Understanding
MWD	Municipal Water District
NEC	National Electric Code
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
SANDAG	San Diego Association of Governments
SRA	State Responsibility Area
UBC	Uniform Building Code
UFC	Uniform Fire Code
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VFPD	Vista Fire Protection District
WFOA	Western Fire Chiefs Association
WUI	Wildland/Urban Interface

INTRODUCTION

This document provides guidance for evaluating adverse environmental effects that a proposed project may have from wildland fire and establishes standards to ensure that development projects do not unnecessarily expose people or structures to a significant risk of loss, injury or death involving wildland fires. Specifically, this document addresses the following questions listed in the California Environmental Quality Act (CEQA) Guidelines:

Appendix G, VII. Hazards and Hazardous Materials

- h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Appendix G, XIII. Public Services

- a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for any of the public services:
 - i. Fire protection?

Appendix G, XV. Transportation/Traffic

- e) Would the project result in inadequate emergency access?

Appendix G, XVI. Utilities and Service Systems

- d) Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

1.0 GENERAL PRINCIPLES AND EXISTING CONDITIONS

A vast amount of the County's undeveloped lands support natural habitats such as grasslands, sage scrub, chaparral, and even coniferous forest. In the context of fire ecology, these areas are known as wildlands. Fire ecology research has shown that the natural fire regime for the shrublands and forests in San Diego County was one of frequent small fires and occasional large fires. Modern society has interrupted and fractured the natural fire process by initiating fire suppression policies, introducing invasive plant species that burn readily (i.e. eucalyptus), and building their homes and living within the wildlands, such as San Diego's back country. By building homes in the wildland, humans are more susceptible to the dangers of large wildland fires.

As more residences and communities are built in the wildlands, improved and new methods to protect people and structures from the risk of loss or death from wildland fires must be considered (Lindroth 2005).

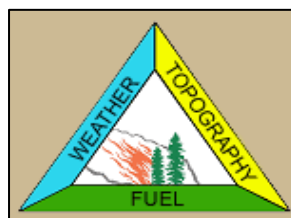
1.1 Wildland Urban Interface and Intermix

The term Wildland Urban Interface (WUI), first defined in 1974 (C.P Butler 1974) in relation to fire, currently means the area where structures and other human developments meet or intermingle with undeveloped wildland (Radeloff et al 2005). Creating a WUI, that is, building within the wildlands, has myriad adverse effects making the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and biodiversity decline. Fire is one of the most serious problems along the WUI boundary (Zedler and Seiger 2000; Radeloff et al 2005; and others)

The goals of protecting people and structures from death or damage during wildfires has changed from suppressing all wildland fires, to learning to live with them, through greater political leadership, agency innovation, public involvement, and community responsibility (Dombeck et al, 2004). The current approach argues for residential compatibility with wildland fire (Cohen 2002; Keeley 2002). As the population of San Diego County increases and the WUI expands, fire hazards and risks continue to be encountered.

1.2 Wildfire Environment

Three factors influence the wildland fire environment: weather, fuel, and topography.



Source: USDA Forest Service

1.2.1 Weather

Weather plays a critical role in determining if a wildland fire will ignite. Dry, hot and windy conditions for prolonged periods of time increase the likelihood for a major wildland fire. The dry and hot weather lowers the moisture content in the wildlands vegetation, contributing to favorable burning conditions. Weather conditions are most hazardous in drought situations because the moisture content of the environment is lower than normal. When supported by high wind speeds, a fire ignited in dry, hot conditions can burn rapidly and intensely. Seasonal dry winds like the “Santa Ana” have a tremendous effect on fire speed and flame length.

Small fires may be excessively fanned and spread by Santa Ana winds, which are dry, sometimes hot dusty winds that blow westward through the canyons toward the coastal areas in southwestern California. Santa Anas are seasonal winds, occurring mostly during fall, winter and spring. However, they are most often associated with late summer and fall when fires can ignite naturally in the extremely dry native vegetation. The extreme winds sustain ignition and can cause wildfires to spread when hot embers drop into the dry vegetation. The high winds also allow the wildfire to spread so rapidly and grow so large that the fires are beyond control or suppression. These conditions led to the October 2003 wildland fires in southern California.

Weather has been considered one leg of the U.S. Forest Service’s Fire Behavior Triangle because large fire seasons in the western U.S. during the 20th century helped shape the U.S. Forest Service’s fire suppression policy. These fires occurred during drought years and were spread by the Santa Ana winds of that season. The evolution of fire research was first fire as forestry, then fire as physics, by the end of the 1980s fire effects, and perhaps most recently, global change (Brown 2003). International research and global communications have brought fire into the realm of global issues. Smoke from large fires in the western U.S. as well as in other arid areas, such as Australia, have now been seen to affect the entire Earth, and researchers have become aware that climate underlies the prevalence of wildland fire, which can be enhanced by the more local weather conditions. In the 1960s and 70s, climate dynamics (physics based concepts of the climate system) began to evolve, but the field of climatology did not become highly popular until after the 1982-1983 El Nino event. Media and public popularity of climate blossomed after the successful prediction and occurrence of the 1997-1998 El Nino event, and in the politically charged atmosphere of global warming (Brown 2003).

San Diego County has four climate zones (Figure 1): coast; inland coastal; mountain; and desert. These distinct zones are caused by the County’s varied topography. Natural variations will be an important part of future climate changes and variability, not just in the County, but worldwide. In addition, increased concentrations of atmospheric greenhouse gases and sulphate aerosols are expected to yield important human-induced changes. The Intergovernmental Panel on Climate Change (IPCC) has concluded that there is a strong likelihood of both global and regional climate change. In response to an increase in the globally averaged surface temperature of the Earth, average precipitation is expected to increase, as are changes in occurrences of extreme

events, particularly those related to temperature and precipitation. These aspects of climate change, particularly in a regional context, will directly impact wildland fire (Brown et al. 2004).

1.2.2 Fuel

Fuel is required for a fire to burn. In a wildland fire the native vegetation provides the fuel, which usually includes both living and dead vegetation. The amount, arrangement, and moisture content of the fuel, known as fuel load, can influence the ignition and intensity of a wildland fire. The amount of fuel depends on the volume and type of vegetation; typically, the greater the density of vegetation, the greater the wildfire threat. An indefensible home in the wildland can also become fuel for a wildland fire.

In San Diego County wildland fire is prevalent in cismontane shrublands (various types of chaparrals and sage scrubs) and, to a lesser extent, montane coniferous forests. This is consistent with a pattern of increased fire ignitions along the relatively low elevation urban-wildland interface, and an increase in the efficiency of fire suppression in high elevation forests (Wells et al 2004). Though occurring in the desert, fire is less of a danger to people and structures there.

The conditions of the vegetation and climate influence the intensity of a wildfire. Dependent upon the vegetation's moisture content a wildfire threat may be minimized or exacerbated. Moisture content is based on the type of soil, plant material, and atmospheric conditions. For example, clay soils retain more moisture than sandy and rocky soils; hydrophytes (wetland) and riparian vegetation retain more moisture than coastal sage scrub; and the coastal zone tends to be more humid than the interior. Contrary to popular belief, some native shrubs in San Diego County have higher moisture levels than ornamentals, when growing in similar environments. In effect, the higher the moisture content, the lower the wildfire threat.

1.2.2.1 Shrublands

Some researchers have considered the natural fire regime in southern California shrublands to be one of small, frequent fires that fragmented the landscape into a fine-grained mixture of vegetative age classes that precluded large, catastrophic fires and that society, through fire suppression, interrupted that natural regime. They believed that highly effective fire suppression actions suppressed this regime and resulted in the large catastrophic fires such as those in 2003. Recent field research on the fire regime shows that the natural fire regime before human intervention included large, high-intensity fires, leading to the conclusion that current fire management policies have not created the contemporary large fire regime but that it has always been present (Keeley and Fotheringham 2001).

Loss of property and lives increases in places where people and structures are placed within the wildlands that are naturally subject to high intensity fires (Keeley 2004). As development pushes further eastward in San Diego County, more and more people are subject to the hazards of living with wildland fire. Often homes and other structures are

built and maintained in a manner that leaves them and their occupants especially vulnerable.

Though people may not cause fires to be large, human carelessness and arsonists have caused wildland fires to be more frequent. Shrublands have not adapted to fire itself, but to a particular fire regime that provides a period of extended disturbance-free conditions for regrowth of native shrubs and other native species (Keeley 2004). When shrublands burn more often than every two or three decades (at a minimum) they can be degraded or even converted to annual grasslands that are resistant to recolonization by native shrubs but vulnerable to invasion by non-native invasive weeds. Invasive non-native species can have a drastic effect on native vegetation communities, including altering their fire regimes (Brooks et al. 2004).

1.2.2.2 Forest

The mountains in San Diego County are the central portion of the Peninsular Ranges, which extend northward into Riverside County (San Bernardino Mountains) and southward into Baja California to the Sierra San Pedro Mártir. The fire regime in the Peninsular Ranges of southern California have been shown to be more like the that of the Sierra San Pedro Mártir than to the Sierra Nevada (Skinner et al 2006). In the Sierra San Pedro Mártir, where fires have not been suppressed, fire return periods averaged 52 years from 1925-1991, and 24 years for the past 300 years (Minnich et al 1994). The fire regime is one of relatively high intensity surface fires that denude surface litter, shrubs, saplings, and pole-size stems, forming open forests of mature trees. These fire result in large diameter canopy trees and low density in smaller size classes. Natural ignition rates are sufficiently high over fire rotation periods of 52 years that most lightning discharges strike immature stands and begin mostly spot burns. Therefore, all stands experience fire frequently (perhaps every 20 years), but the total fire occurrence at a site is a mixture of spot burns and infrequent landscape-scale burns, the latter accounting for most disturbance and consumption of fuels (Minnich et al 2000). However, as a result of fire suppression the composition of the forests in southern California are different than those in the Sierra San Pedro Mártir (Gill 2002). In the Sierra Nevada, suppression has resulted in generally eliminating fires of low-to moderate severity, and since current technology is not capable of eliminating the high-severity fires, the fires that affect significant portions of the landscape are now almost exclusively high-severity, large, stand-replacing fires (Skinner and Change 1996).

The fuel load in the region's mountain forests has been dramatically increased by an overwhelming number of dead and dying trees. The on-going drought conditions in Southern California and the long term exposure to air pollution, particularly ozone, have stressed the trees. Excessive ozone exposure causes premature loss of pine needles, reducing the trees ability to produce food and tissues. Much of the forested land is overstocked, increasing drought stress to the trees. Mortality in the drought-stressed trees is caused by complexes of pests, including leafy and dwarf mistletoes, root diseases, bark beetles, and flatheaded borers. Bark beetles are commonly believed to be the culprits. However, it is not uncommon to find dead and dying trees which have not been attacked by tree killing bark beetles, but rather succumbed to the cumulative

effects of water stress and pests other than bark beetles, particularly mistletoe and root disease. In many areas of the forests, the vegetation is at a density that can only be supported in wet years, resulting in dieback during these dry years. Thus the current mortality is driven by the overstocked condition of the forest, not by the presence or absence of any particular pest. Compounding the problem in urban areas are poor management practices (construction, inappropriate planting and irrigation, etc.) resulting in damage to tree roots. (Southern California Society of American Foresters 2007).

1.2.2.3 Invasive Species

Human have introduced nonnative species and have contributed to their wide-spread invasion of native plant communities throughout the developed world. Chaparral habitats require stand-replacing fires at intervals of at least 20 years (Keeley 2003). Following the opening of the chaparral canopy by fire under normal conditions, annual plant species, called fire-followers, dominate the chaparral for a few years as the chaparral shrubs resprout from stumps and burls, and germinate from seeds. As these shrubs grow, the canopy again closes so that much of the ground beneath the chaparral is bare. More frequent burning, as when wildland fire is human caused, disrupts this cycle by keeping the chaparral shrubs burned away. This disruption of the normal fire regime can allow nonnative species to dominate the fire-followersl when the shrubs are not allowed to grow to maturity. With the introduction of a vast array of nonnative species, many of which are from regions of the world with Mediterranean climates so they grow well in San Diego County, nonnative species can replace native species.

Invasive plants can change fire regimes in ways that promote their own dominance. Densely packed invasive grasses are notorious for increasing landscape flammability, which promotes fire return intervals that are often much shorter than native plants can survive (Brooks 2001; Brooks and D'Antonio 2003; Menakis et al. 2003).

1.2.3 Topography

Topography can dramatically increase fire speed in areas with steep slopes. Steep topography allows for a slope to be pre-heated from convection that allows for faster combustion of fuel. As a general rule it can be assumed, the steeper the terrain, the faster the fire speed.

1.3 Wildland/Urban Interface Ignition Factors

Fires can ignite naturally or be caused by people. In the montane coniferous forests of the Southwest, lightning-ignited fires are abundant and human ignitions are far less important than in lower-elevation shrublands of southern California where lightning is uncommon and humans cause most of the fires (Keeley and Fotheringham 2003). Over 95 percent of fires in southern California shrublands have been started by people, which has increased fire frequency and increased the chances of ignitions during Santa Ana winds (Keeley and Fotheringham 2003). In general, more people have exposure to the shrublands than to the forests, since most of the development in San Diego County is

on the coastal plain and in the foothills. People living in the wildlands, traveling on roads built through the wildlands, and recreating in the wildlands can ignite wildland fires inadvertently. In addition, wildland fires are sometimes ignited by arsonists. All these situations create more opportunities for potential wildland fire danger to people and their structures.

Wildland fires only spread if the wildfire meets the oxygen, fuel and heat requirements for ignition and continued combustion. In wildland fires oxygen is not limited, so the continuation of wildfire combustion relies on fuel and heat. Fuel, as mentioned above, is commonly the wildland vegetation and landscaping, but structures and accessories such as projections can add to the fuel source. Burning fuel creates heat and heat allows fires to spread when there is sufficient fuel. Three primary means of heat transfer can result in ignition: conduction, convection and radiation.

1.3.1 Conduction

Conduction is heat transfer through a solid or from the heated surface to the interior of a solid. An example of heat conduction resulting in structure ignition would be flame impinging on the exterior metal siding of a mobile home. Like a frying pan, heat is transferred to structural components inside, resulting in ignition.

1.3.2 Convection

Convection is defined as transfer of heat by a circulating fluid – either gas or liquid. Heat rises from a wildland fire and is transferred by air currents to other objects, such as a house on a ridge top. Winds can carry heat by convection to vegetation and structures.

1.3.3 Radiation

Radiation is energy transfer that travels across space without the need for intervening medium such as air. Examples in wildfires include ignition of light combustibles in advance of the flame front, like dry fine grasses or curtains behind a window. Radiation does not require flames to strike a structure to cause ignition. The source of flame radiation is the flame-front. Dependent on the length, height, and width of the flame-front (the leading edge of a wildland fire), and the flame duration, an unprotected structure can be ignited by radiant heat.

1.3.4 Firebrands

Firebrands are burning embers that become airborne and are blown beyond the fire front. Firebrands can be created from virtually any fuel source that is light enough to be blown upwards; however, vegetation is the most common source of firebrands. Firebrands combine heat transfer methods of conduction and convection. Firebrands extend the boundaries of wildland fire hazard zones and present a prominent threat to structures, especially homes. Dependent on weather and the size of the ember, a

firebrand can be carried far ahead of the fire front. The hazard can be worsened if structures are not ignition-resistant and cannot repel the heat of a burning ember.

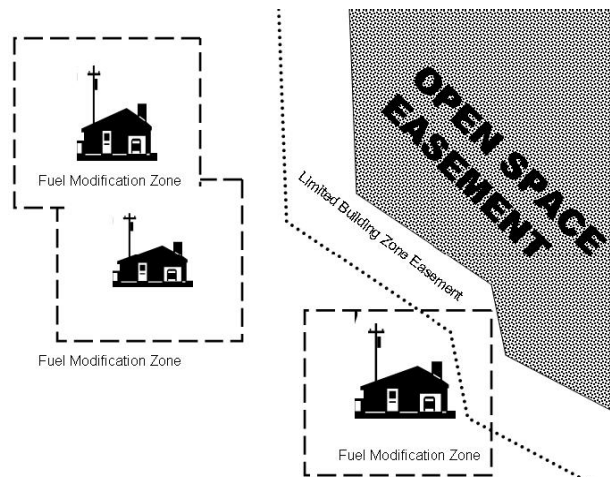
1.3.5 Flame Impingement

Flame impingement, a form of heat conduction, involves heat transfer from a flame that directly strikes a structure, potentially causing ignition of the structure. Flame size and the duration of flame impingement directly affect the potential for ignition of a structure.

1.4 Defensible Space

To improve the survivability of structures in a wildland fire event, fire professionals recommend using defensible space around all structures occupied by human or domestic animals. Defensible space creates a separation zone between wildlands and structures, a space where fuel is managed or modified to minimize the spread of fire to the structure and allowing space for defending structures from burning vegetation. Fuel management includes keeping the area clear of flammable manmade materials and managing the vegetation to reduce its flammability. Vegetation management begins with correctly spacing plants to reduce fire risks to the home, and then by watering, pruning and thinning the vegetation regularly. The landscaping around a house in the WUI must be maintained. Defensible space reduces fire speed, intensity, and flame lengths, and limits the spread of a wildfire. This area is known as a fuel modification zone (FMZ), which is not to be confused with the limited building zone (LBZ). An FMZ is a protective buffer that surrounds a structure while an LBZ is a protective buffer that surrounds a biological open space area. The FMZ and LBZ may completely overlap, partially overlap or not touch at all (Figure 2).

Figure 2. Fire Modification Zone and Limited Building Zone



1.5 Defensible Structures

Wildfires are dangerous and unpredictable. In a wildfire event firefighting resources are often over-extended and may be unavailable. Defensible space alone does not always

ensure the safety of structures confronted by a wildfire. Many additional precautions will assist in the survival of structures from wildland threats. The California Department of Forestry and Fire Protection (CDF), County of San Diego, and local fire districts provide guidance on preparing structures for wildfire including roof and yard maintenance, landscaping and construction practices, and providing adequate emergency water supply and access.

1.6 Fire Agencies

The main entities that are responsible for ensuring the health and public safety in unincorporated area of San Diego County are the agency and fire protection districts (FPDs). The information below is provided in part by the Municipal Service Review & Sphere of Influence Update Study, by the Local Agency Formation Commission (LAFCO).

The enforcement responsibilities within CDF and the FPDs are by any person designated by the FPD's Chief to exercise the powers and perform the duties of the fire prevention engineer as set forth in their respective fire code as ratified by the Board of Supervisors. In the unincorporated areas of the County outside of a FPD, the enforcement responsibility lay with the person designated by the Chief Administrative Officer of San Diego County or his/her authorized representative.

California Department of Forestry and Fire Protection (CDF) – CDF is an emergency response and resource protection department that responds to more than 5,600 wildland fires that burn over 172,000 acres in the state each year. In addition, department personnel respond to more than 300,000 other emergency calls including structure fires, automobile accidents, medical aid, swift water rescues, civil disturbance, search and rescue, floods, and earthquakes. CDF is the state's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CDF has joined with federal and local agencies to form a statewide mutual aid system. This system insures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction.

Alpine Fire Protection District – Alpine FPD was formed on December 19, 1957, covers 27.5 square miles, and serves 17,500 residents. The District dedicated the new Station 17 located at 1364 Tavern Road on March 17th 2006. The design of this new 13,150 square foot facility incorporated 5,000 square feet for a 4 bay apparatus area and 8,150 to living space and office space for administration. The district has two Type I (structure fire engines), and one Type III (wildland fire engine), two command vehicles, two support/utility vehicles and a multi-casualty trailer. Additionally, station 17 also houses one Medic Unit provided by a joint operating agreement with American Medical Response (AMR), Grossmont Health Care District, and the County of San Diego.

Bonita-Sunnyside Fire Protection District – Formed in 1950 and reorganized in 1952, the Bonita/Sunnyside FPD provides fire protection, rescue, emergency medical

services (paramedic Engine Company), community education, and prevention services to residents living in a 5.5 square mile area in the Sweetwater Valley, near the city of Chula Vista. Funding is provided through a combination of property taxes and a local benefit fee. Paramedic ambulance transport is provided through the Chula Vista Paramedic Exclusive Operating Area. Resident population is estimated at 15,966 (U.S. Census Bureau, tabulated by SANDAG).

Borrego Springs Fire Protection District – Formed in 1961, the District surrounds the community of Borrego Springs, encompassing an area of 305.5 square miles. The District provides structural and wildland fire suppression (though wildland fire protection is largely the responsibility of the CDF), fire prevention, rescue services, and ALS ambulance medical services from one station. Resident population is approximately 5,700 (SANDAG).

Deer Springs Fire Protection District – This District is located north of the City of Escondido, northeast of the City of San Marcos, and covers approximately 45 square miles. Established in December 1981, the District provides structural fire protection, rescue, Emergency Medical Service (EMS) with Emergency Medical Technicians (EMTs), inspection, and fire prevention programs from two fire stations. Resident population is 11,137 (SANDAG). Advanced Life Support (ALS) ambulance service is provided through the Valley Center ALS Ambulance Service Area.

East County Fire Protection District – The East County FPD was formed on July 1, 1994, when the Bostonian and Crest FPD's were consolidated into one district. The consolidated District furnishes fire suppression, rescue, code compliance, emergency medical (Basic Life Support (BLS), transportation and paramedic engine company, EMS, fire prevention, and community education. The District is funded through a combination of property taxes and local benefit fees. Paramedic Ambulance transportation is provided through County Service Area (CSA) 69. Resident population is estimated at 13,276 (U.S. Census Bureau, tabulated by SANDAG).

Julian-Cuyamaca Fire Protection District – This District encompasses approximately 81 square miles amid the mountains of eastern San Diego County. The District began operations in June of 1983 and provides structural and wildland fire suppression (though wildland fire responsibility is largely under the CDF and USFS), ALS ambulance services, fire prevention, and rescue from two stations: one located in Julian and the other in Cuyamaca. The District also provides ALS ambulance service to Shelter Valley, Santa Ysabel and portions of the Highway 78 corridor. Resident population is 3,442 (SANDAG).

Lakeside Fire Protection District – The Lakeside Fire Protection District covers an area of approximately 55 square miles. The district provides structural and wildland fire suppression, emergency medical (paramedic engine company) and rescue services, as well as code compliance, public service, education, and safety programs. Paramedic ambulance transportation is provided through CSA 69. Resident population is estimated at 64,383 (U.S. Census Bureau, tabulated by SANDAG).

North County Fire Protection District – This FPD encompasses 92 square miles, including the communities of Fallbrook, Bonsall, and Rainbow in northern San Diego County, and serves a population of 49,108 (SANDAG). The District provides structural and wildland fire protection, though wildland responsibility lies with the CDF, as well as paramedic first-responder and ambulance transport emergency medical services, rescue and fire prevention. The District operates from six stations. The District provides administrative support to the Rainbow Volunteer Fire Department (CSA), which became part of the District in 1986.

Pauma Valley Municipal Water District (MWD) – The Pauma Valley MWD encompasses 12,813 acres in the Pauma Valley area of northern San Diego County. The District has a joint powers agreement with the Mootamai and Pauma water districts to provide fire protection during the winter months through an Amador contract¹, when the CDF station located just west of the intersection of Highway 76 and Valley Center Rd would otherwise be closed. Through the Amador contract, the CDF provides structural fire protection, rescue and EMS, while ALS ambulance service is provided through the Valley Center ALS Ambulance Service Area.

Pine Valley Fire Protection District – Encompassing approximately 75 square miles, the Pine Valley FPD is located in the unincorporated communities of Pine Valley and Guatay, along Interstate 8 in the eastern portion of San Diego County. The District provides structural fire protection, emergency medical services, vehicle extrication and rescue to this area. The district also responds to wildland fires, though wildland fire protection within this area is predominantly the responsibility of the USFS and the CDF. Paramedic ambulance transport is provided through the Grossmont Health Care District II. Resident population is estimated at 2,695 (U.S. Census Bureau, tabulated by SANDAG).

Ramona Municipal Water District – The Ramona MWD, located near the geographical center of the San Diego County, was formed on August 15, 1956, as a publicly-owned special district. The District provides water, sewer, fire protection, emergency medical services and park services to the public. The District's boundaries extend approximately 75 square miles, with an estimated current population of 35,000. The Fire Department was managed by the District until July 1, 1993, when the Board entered into an agreement with the California Department of Forestry & Fire Protection (CDF), to provide the fire and paramedic services.

¹ Amador Contracts vs. Full Service Cooperative Agreement Contracts: Amador contracts are cooperative agreements (Public Resources Code Section 4144) for areas where CDF already provides services during the "fire season." Amador contracts are where local governments pay CDF to provide service during non-fire season, as well, supplementing the local fire department. Full Service cooperative agreements (Public Resources Code 4142) means a county pays for CDF to become their fire department, year-round.

Rancho Santa Fe Fire Protection District – Formed in 1946, the Rancho Santa Fe FPD provides services to 24,409 (SANDAG) people living in a residential area of approximately 42 square miles, located between Interstates 5 and 15 north of San Diego's city limits. The District provides structural and wildland fire protection, though wildland responsibility largely remains with the CDF, EMS (BLS and ALS first-response), rescue, prevention, and community education. The Department operates from four fire stations. ALS ambulance transport service is provided through CSA 17.

Rincon Del Diablo Municipal Water District – In 1976, Rincón Del Diablo MWD established Improvement District (10) "E" to provide fire protection, paramedic ambulance transport, and emergency services to residents within the MWD. Containing unincorporated areas to the east, south, and west of Escondido, services are provided by contract with the City of Escondido signed in 1984. The contract for services covers all of 10 "E" that is outside the city boundary.

San Diego Rural Fire Protection District – Formed on May 18, 1983, the San Diego Rural FPD consolidated 13 East County volunteer fire departments. The District protects an area of approximately 690 square miles and provides emergency medical services, structural fire protection and rescue services. The District also responds to wildland fires, though wildland protection within this area is predominantly the responsibility of the CDF. Paramedic ambulance transport is provided by the Grossmont Health Care District II. The population is estimated at 30,209 (SANDAG).

San Marcos Fire Protection District – The San Marcos FPD is a subsidiary district of the City of San Marcos and is governed by the City Council. The District encompasses 33 square miles, 24 of which lie within the San Marcos city limits. The District operates from three stations located throughout the City of San Marcos. Paramedic service is available from each station through the use of paramedic engine companies. The District also provides paramedic ambulance transport service. Estimated population is 78, 206 (SANDAG).

San Miguel Consolidated Fire Protection District – Located east of the Cities of San Diego and Lemon Grove, south of the Cities of La Mesa and El Cajon, and west of the communities of Jamul and Crest, the San Miguel Consolidated FPD covers approximately 45 square miles of unincorporated territory and covers four square miles in the City of Lemon Grove. The FPD provides structural fire protection, wildland fire suppression, rescue and emergency medical services (paramedic engine company), code compliance, fire prevention and education to the communities of Spring Valley, Casa de Oro, La Presa, Grossmont/Mt. Helix, and Rancho San Diego. Paramedic ambulance transport is provided through the Grossmont Health Care District I. Resident population is estimated at 143,691. (U.S. Census Bureau, tabulated by SANDAG).

Valley Center Fire Protection District – The Valley Center FPD covers an area of 83 square miles in and around the community of Valley Center, north of the City of Escondido and east of interstate 15. The District provides structural and wildland fire suppression, though wildland fire responsibility remains with the CDF, and EMS, with service provided to the District from two stations. Ambulance service is provided through the Valley Center ALS Ambulance Service Area. Population is 14,657 (SANDAG).

Vista Fire Protection District (VFPD)– Fire protection to the VFPD area was initially provided by the all-volunteer Vista Rural Fire Protection District in 1928. The VFPD was adopted by the San Diego County Board of Supervisors on July 14, 1944. In 1963 when the City of Vista incorporated it removed 12 square miles from the district with the two entities sharing pro rata costs. The VFPD was set up to serve both agencies equally. In 2005 a new contract was signed which brought all assets under one roof. The VFPD covers approximately 16.9 square miles and a population of 11,105 (SANDAG). The service area of the Vista City Fire Department, including both the City and the District, is approximately 28.9 square miles and serves a population of 112,000 residents. The City of Vista Fire Department has four stations, and is building two new station to open in 2008. It also provides paramedic ambulances transport services within the City and District.

1.7 County Service Areas

County Service Areas (CSAs) are organized under the authority of the Board of Supervisors to provide a level of emergency response within a defined jurisdictional boundary by using volunteers. CSAs have defined boundaries and participate in the Fire Mitigation Fee program, which funds facilities and equipment, but the CSAs lack the authority to adopt a fire code or provide official response to planning and building projects. The current CSA's located within the County include the following:

- Boulevard (#111)
- Campo (#112)
- Elfin Forest (#107)
- Mount Laguna (#109)
- Pepper Drive (#115)
- Palomar Mountain (#110)
- San Pasqual (#113)

2.0 EXISTING REGULATIONS AND STANDARDS

A number of existing laws, regulations, policies and programs have been enacted to prevent, manage or mitigate the threat of wildland fires to public health, safety and the environment. The following discussion is an overview of the primary existing regulations that affect wildland fire in San Diego County. The regulations discussed below have been chosen for their applicability to the typical development project encountered in San Diego County and for their usefulness in assessing potential adverse project impacts as defined by the California Environmental Quality Act (CEQA), focusing on the threat these fires would pose to people or structures.

2.1 Federal Regulations and Nationally Recognized Standards

[[Regulation]]

National Environmental Policy Act as amended [Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982). <http://www4.cornell.edu/uscode/42/ch55.html>] Federal agencies that implement the National Environmental Policy Act (NEPA) consider potential public health and safety hazards including wildland fires when considering the environmental impacts of proposed federal projects

[[Nationally Recognized Standard]]

Uniform Fire Code [2000 edition published by the Western Fire Chiefs Association and the International Conference of Building Officials, is a consensus model code which may be adopted by a jurisdiction. It forms the basis for the current California Fire Code (CCR Title 24 part 9)] The Uniform Fire Code (UFC) is the underlying nationally recognized consensus code that sets standards and requirements to safeguard against the threat wildland fires may pose to public health, safety, and the environment. The UFC, when adopted by a jurisdiction, regulates the planning, construction and maintenance of development near wildland areas. The UFC in combination with the California Building Code (CBC), National Electric Code (NEC), Uniform Mechanical Code (UMC), and Uniform Plumbing Code (UPC) set uniform building, electrical, mechanical, and plumbing standards that collectively aim to reduce the threat of wildland fires to people or structures. The Fire Agency Having Jurisdiction (FAHJ) is primarily responsible for ensuring conformance to the Uniform Fire Code.

[[Nationally Recognized Standard]]

National Fire Code (<http://nfpa.org/codes/index.asp>) The National Fire Codes and NFPA Standards are a product of the National Fire Protection Association (NFPA), a world-wide organization of fire industry, fire agencies, fire professionals and concerned individuals. These model codes are annually compiled from the codes, standards, recommended practices, manuals, guides, and model laws that are prepared by the individual technical committees of the NFPA. Most are revised on a three-year cycle. The published code amendments are voted on by the members of the NFPA. The individual codes are in many cases adopted by jurisdictions, or modified and adopted as that jurisdiction's ordinance.

2.2 State Regulations and Standards

[[Regulation]]

California Environmental Quality Act Guidelines [Public Resources Code 21000-21178; California Code of Regulations, Guidelines for Implementation of CEQA, Appendix G, Title 14, Chapter 3, §15000-15387.] Consideration of impacts relating to wildland fires is required by CEQA. The CEQA Guidelines are concerned with assessing impacts associated with exposing people or structures to wildland fires.

[[Regulation]]

California Building and Fire Codes [California Code of Regulations, Title 24 parts 2 & 9, <http://osfm.fire.ca.gov/>] Title 24 contains several Uniform Codes that address fire safety including the Uniform Fire Code, Uniform Building Code, Uniform Mechanical Code, and Uniform Plumbing. The Uniform Fire Code was assembled with the Uniform Fire Code of the Western Fire Chiefs Association, above, and modified California Building Standards Commission.

[[Regulation]]

California Code of Regulations Title 14 (Fire Safe Regulations) also contains regulations that have been prepared and adopted for the purpose of establishing minimum wildfire protection standards in conjunction with building construction and development in the State Responsibility Area (SRA). Over 90 percent of the unincorporated area of the County is located within the SRA.

2.3 Local Regulations and Standards

[[Regulation]]

County of San Diego Building and County of San Diego Fire Code [Chapter 3 of Division 5 of Title 3 of the San Diego County Code of Regulatory Ordinances) and County Building Code (Title 5, Section 51.0001 et al)] Following the October 2003 wildfires, assessments were made of damaged and destroyed homes in an effort to identify areas where codes could be strengthened in order to enhance the chances of a structure surviving a wildfire. As a result, in June 2004, the County amended the Fire Code and Building Code to include two-tiered ignition-resistive construction requirements (basic and enhanced) for all new construction.

[[Regulation]]

County of San Diego Consolidated Fire Code [County Health and Safety Code §13869.7. Includes Ordinances of the 17 Fire Protection Districts as Ratified by the San Diego County Board of Supervisors, First Edition, October 17, 2001 and Amendments to the Fire Code portion of the State Building Standards Code, 1998 Edition. The County of San Diego is unique within the State of California in having 17 fire protection districts within its boundaries. For the purposes of prescribing regulations in the unincorporated area of the County of San Diego, the applicable fire code is known as the County Fire Code and includes the Consolidated Fire Code and adopts by reference the California Fire Code, 2001 edition (CCR T-24 part 9). The Consolidated Fire Code consists of local fire protection district ordinances. The purpose of the Code is for the protection of the public health and safety which includes permit and inspection

requirements for the installation, alteration or repair of new and existing fire protection systems, and penalties for violations of the code. The Code provides the minimum requirements for access, water supply and distribution, construction type, fire protection systems and vegetation management. Additionally, the fire code regulates hazardous materials and associated measures to ensure that public health and safety is protected from incidents relating to hazardous substance releases.

Memorandum of Understanding [Agreement Between United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), California Department of Forestry and Fire Protection (CDF), San Diego County Fire Chief's Association and the Fire District's Association of San Diego County (<http://www.sdcountry.ca.gov/dplu/Resource>)]. The MOU was created to establish guidelines by which fire agencies can continue to require abatement of flammable vegetation without violating environmental regulations for the protection of habitats and species.

[[Regulation]]

Combustible Vegetation and Other Flammable Materials Ordinance [San Diego County Code of Regulatory Ordinances, Title 6 Health and Sanitation, Division 8 Sewage and Refuse Disposal, Chapter 4 Abatement of Weeds and Rubbish, <http://www.amlegal.com>] This ordinance addresses the accumulation of weeds, rubbish, and other materials on a private property found to create a fire hazard and be injurious to the health, safety, and general welfare of the public. The ordinance constitutes the presence of such weeds, rubbish, and other materials as a public nuisance, which must be abated in accordance with the provisions of this chapter.

Local Fire Agencies' Ordinances. Certain codes like the Fire and Building codes can be amended to be more restrictive based upon local climatic, geological and topographical features that can have a significant effect on fire protection and emergency services. These amendments are based upon fire agencies findings and local conditions within the County of San Diego (See Section 1.6 for a list of fire agencies within the County of San Diego).

3.0 TYPICAL ADVERSE EFFECTS

Generally, two types of adverse effects are typically associated with wildland fires; the immediate effects that occur during a wildland fire event and the effects that occur in the aftermath. During a wildfire event, people and structures are exposed to risk of loss, injury or death. Assessing and ranking the level of risk is always relative; unwise human action, for example, could be life-threatening even with all other factors at reasonable levels.

Since the level and type of risk can vary from project to project, prioritizing the project deficiencies (or combination of deficiencies) that create the biggest risk is difficult. In general, however, the following circumstances can result in increased fire related risks to people and structures:

- Projects located adjacent to and within the WUI and/or that incorporate large open space preserves within the project design;
- High population and density in the WUI;
- Responses of people during a wildland fire event (human behavior);
- Emergency response services (fire stations, equipment and personnel) are inadequate to serve the project;
- Development projects that are built without ignition-resistive construction, interior fire sprinklers, and/or sufficient water supply (volume) and pressure; and
- Inadequate access, maintenance of landscaping restrictions, FMZs, and periodic fuel management.

Another less obvious effect of wildfire events is the loss or permanent change of natural resources. Since prehistoric times wildfires have been a part of the San Diego landscape; however, increased human habitation and use of the County's wildlands has increased the frequency of wildfire incidents, which adversely affects the County's diverse resources.

At the same time, fire suppression activities have resulted in older stands of native fuel, with a greater percentage dead, combustible material. When these old stands do burn, especially in a Santa Ana wind event, they burn far hotter and more destructively. These less-frequent, hotter, uncontrolled fires result in a loss of natural resources, including type-conversion, as experienced in Cuyamaca State Park.

Although wildfires are considered a natural process necessary to the functioning of many ecosystems, a wildfire's aftermath typically leaves land scorched and exposed. Until the land rehabilitates, the exposed soils may contribute to adverse environmental impacts including air and water pollution and unstable soils conditions (mudslides). The end result of uncontrolled wildfire also includes debris from burned homes, some of which can be highly toxic, and can adversely impact the environment by polluting local waterways (streams and rivers).

4.0 GUIDELINES FOR DETERMINING SIGNIFICANCE

Section 15382 of the State CEQA Guidelines states that a significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air and water. **An affirmative response to or confirmation of any one of the following Guidelines will generally be considered a significant impact related to Wildland Fire and Fire Protection as a result of project implementation, in the absence of scientific evidence to the contrary:**

- 1. The project cannot demonstrate compliance, or offer Same Practical Effect², with applicable fire regulations, including but not limited to the California Fire Code, California Code of Regulations, County Fire Code, or the County Consolidated Fire Code.***
- 2. A comprehensive Fire Protection Plan has been required and the project is inconsistent with its recommendations including fuel modification.***
- 3. The project cannot meet the emergency response objectives identified in the Public Facilities Element of the County General Plan or offer Same Practical Effect.***

The significance guidelines listed above have been selected for the following reasons:

The **first** guideline for determining significance is based on compliance with existing wildland fire regulations. Since the applicable regulatory requirements for a project will differ based on use type and extent of the WUI, all discretionary projects are required to prepare a Fire Protection Plan (FPP) designed to assess a project's compliance with current regulatory codes and ensure that impacts resulting from wildland fire hazards have been adequately mitigated. The FPP is similar to a Technical Report as authorized in the Fire and Building Codes, and is prepared by a wildland fire behavior and fire code expert for review by the County and FAHJ.

The authority to require FPP can be found under the California Fire Code, Article 86. Examples of regulatory requirements that a project will be required to meet include the California Fire Code, County of San Diego Consolidated Fire Code and the standards outlined in Section 5 of this chapter. Given the complexity of wildland fire regulation and the numerous agencies that have regulatory enforcement responsibility over projects that deal with wildland fires, applicable regulations will be determined on a project-by-project basis. Due to the potential severity of impacts from fire in wildland areas, the existing laws are stringent and regulate all aspects of wildland fire and their hazards including

² "Same Practical Effect" as defined under California Code of Regulations, Title 14, Section 1271.00 (Definitions), and as used in these guidelines, means an exception or alternative with the capability of applying accepted wildland fire suppression strategies and tactics, and provisions for fire fighter safety, including access for emergency wildland fire equipment.

building standards, fuel modification, water availability/flow, and access or demonstrated same practical effect. Any project that does not show compliance with regulatory codes or does not include a valid risk assessment for the project site may result in a potentially significant impact of wildland fire hazard.

The **second** guideline applies to all projects that are required to conduct a Fire Fuel Assessment (Fire Model) as part of its Fire Protection Plan. The Fire Model will evaluate a worst-case scenario wildland fire event based on site topography, fuel loads, atmospheric conditions, and maximum heat production. From the results of the model, combined with the consultant's expertise, minimum fuel modification and brush clearance distances can be determined to ensure relatively safe building sites. These fuel-modeling programs are widely accepted and used throughout the fire fighting profession as a planning tool; moreover, the models are developed by expert fire-modeling professionals. However, fire history and professional experience may require greater or lesser requirements for individual projects.

The fire model gives general guidance and typically calculates average behavior over time. Any project that would not be consistent with the consultant/fire authority's recommendations based on the Fire Modeling, fire history, and personal experience or expertise for that site (after review and approval) may result in a potentially significant impact and may present significant risk of loss, injury or death.

The **third** guideline for determining significance is based on the need to have adequate fire services available in order to provide sufficient emergency response in the event of a wildfire or other emergency. Applicants are required to obtain a Project Facility Availability Form (DPLU Form #399F) that is completed and signed by the FAHJ prior to formally submitting the application to the County. The FAHJ will review the project and determine whether existing fire services are adequate to serve the project. A Project Facility Availability Form that shows that a project is not located within the fire district boundaries and eligible for service, does not meet the travel time requirements specified under the County's Facilities Element, is unable to implement the required FMZ, or is unable to provide adequate water flow and pressure may result in a potentially significant impact and may present significant risk of loss, injury or death. Travel time is determined by measuring the most direct reliable route with consideration given to safe operating speeds for heavy fire apparatus. Travel time does not include reflex or reaction time, or on-scene size-up and set-up prior to attacking the fire, all of which are critical precursors of actual fire fighting. Travel time may be calculated by using NFPA 1142 Table C.1.11(b), SANDAG layering, DPLU-GIS software travel time mapping, actual emergency travel time run data, or actual driving tests. In no instance shall the methods to determine travel time supersede the travel time determined by the FAHJ.

5.0 STANDARD MITIGATION AND PROJECT DESIGN CONSIDERATIONS

To effectively mitigate wildland fire hazards in Southern California, a multi-lateral approach that involves Federal, State, and local governments and fire agencies is usually necessary. Collectively, the County and fire agencies work together to prevent the loss of life in wildland fires; prevent the ignition of structures by wildland fires; prevent the encroachment of wildland fire upon communities; prevent a wildland-caused structural conflagration; and to limit the size of wildland fires.

Wildland fire mitigation measures and design considerations used in the planning and land use approval process vary depending on the wildland characteristics of the site and surrounding area. In order to allow this flexibility in project design, many wildland fire regulations are written using language that is often subject to interpretation (e.g. “secondary access may be required in the following circumstances...”) as opposed to codes that are absolute (e.g. “Class “A” roofing material shall be required”). This allows projects with unique geographic and topographic conditions to adequately mitigate wildland fire risks through project design.

In order to determine whether a project has adequately mitigated for impacts resulting from wildland fire hazards, discretionary projects are required to submit a Fire Protection Plan (FPP). The FPP, at a minimum, must determine that the project is consistent with the intent of the applicable fire regulations relating to unique problems of site location, site topography, geology, and flammable vegetation, as relates to the following areas:

- Emergency Services;
- Access (primary and, if required, secondary);
- Firefighting Water Supply;
- Ignition Resistant Construction; and,
- Defensible Space, Ornamental Landscaping and Vegetation Management

Each of these design considerations is detailed below and includes discussions on relevant Federal, State and local codes and the standards that are used to ensure compliance with the regulations. Failure to comply with either the fire code/regulations or the standards may result in a potentially significant impact.

5.1 Emergency Services

Fire protection and emergency services are among the most vital and basic of community needs. Firefighters, who are generally the first responders to disasters, must be prepared to respond quickly and effectively to all types of emergencies, including wildland fires. For this reason, the provision of adequate facilities for fire protection and emergency services is fundamental to protecting the health, safety and general welfare of the residents of San Diego County.

5.1.1 Emergency Fire Response

5.1.1.1 Applicable Code/Regulations

Part XII of the San Diego County General Plan (Public Facilities Element), Section 11 – 1: Fire Protection and Emergency Services.

Prior to approval of a project, a finding must be made that sufficient fire protection is available or will be available concurrent with the need for all discretionary projects. The finding will be based on meeting the emergency travel times listed in Table 1 and the requirements and information from the responsible fire agency. If the appropriate emergency travel time cannot be met for a proposed discretionary project, the project will be denied unless sufficient mitigation measures are included as a basis of approval based on the recommendations of the Director of Planning and Land Use and the Fire Authority Having Jurisdiction (FAHJ).

Table 1
Emergency Response Travel Times

LAND USE CATEGORY	MAXIMUM TRAVEL TIME	LAND USE CATEGORY DEFINED
Town	5 minutes	Single-family residential lots of less than two acres, or more intensive uses such as multi-family residential. Includes all industrial development and all commercial development except neighborhood commercial
Estate	10 minutes	Single-family residential lots from two to four acres in size. Includes neighborhood commercial development.
Rural	20 minutes	Large lot single-family residential and agricultural development. Lot sizes of greater than four acres.

5.1.1.2 Applied Standards

Projects must comply with the emergency travel time requirements specified in the General Plan. Travel time is defined as the estimated time it will take for a responding fire station to reach the furthest structure in a proposed development project. Travel time is determined by measuring the most direct reliable route with consideration given to safe operating speeds for heavy fire apparatus. Travel time does not include reflex or reaction time, or on-scene size-up and set-up prior to attacking the fire, all of which are critical precursors of actual fire fighting. Travel time may be calculated by using NFPA 1142 Table C.1.11(b), SANDAG layering, DPLU-GIS software travel time mapping, actual emergency travel time run data or actual driving tests. In no instance shall the methods to determine travel time supersede the travel time determined by the FAHJ.

NOTE: Stations that are seasonal (not open all year), or are volunteer fire companies without legal responsibility to respond to emergencies, are not considered to meet the travel time requirements of the General Plan.

Where projects exceed these time requirements, the Director of Planning and Land Use may, upon concurrence with the FAHJ, accept mitigation measures. Acceptable mitigation includes, but is not limited to:

- Alternative construction methods and measures;
- Mutual or automatic aide;
- Upgrading existing facilities;
- Constructing new facilities; or
- Implementing a long-term binding agreement aimed at reducing the response time to acceptable limits, or intensified fire protection offering same practical effect.

Proposed mitigation must be implemented prior to final approval of the discretionary permit (prior to recordation of the final map for subdivisions and prior to issuance of building permits for use permits/site plans).

5.2 Emergency Access

Experience has shown that developments with inadequate access (e.g. long roads with a single access point, roads over steep grades, improper road surfaces, and/or narrow roads) significantly contribute to the inability to effectively evacuate residents during a disaster (wildfire, earthquake, or flood) or provide necessary emergency access for fire, ambulance, or law enforcement personnel.

5.2.1 Emergency Access Required

5.2.1.1 Applicable Code/Regulations

California Code of Regulations, Title 14, Section 1273.09 (Dead-End Roads); [[applies to State Responsibility Areas - SRA]]

The maximum length of a dead-end road, regardless of the number of parcels served shall be as follows:

Lots zoned for less than 1 acre:	800 feet
Lots zoned for 1 acre to 4.99 acres:	1,320 feet
Lots zoned for 5 acres to 19.99 acres:	2,640 feet
Lots zoned for 20 acres or larger:	5,280 feet

The above lengths shall be measured from the edge of the roadway surface at the intersection that begins the access route to the end of the road surface at its farthest

point(s) and include all dead end roads accessed from the dead end road. Where the access road crosses areas of differing zoned lot sizes, the shortest allowable length shall apply.

California Code of Regulations, Title 14, Section 1271.00 (Definitions); [[applies to State Responsibility Areas - SRA]]

“Same Practical Effect”: as used in this chapter, means an exception or alternative with the capability of applying accepted wildland fire suppression strategies and tactics, and provisions for fire fighter safety, including access for emergency wildland fire equipment.

County Fire Code Section 902.2.2.8 Secondary Access [[not limited to SRA]]

The Chief may require one or more secondary means of access to a project development or area where he deems that such access is necessary for emergency operations and/or evacuation. The maximum length of a dead-end road, including all dead-end roads accessed from that dead-end road, shall not exceed the following cumulative lengths, regardless of the number of parcels served:

Parcels zoned for less than 1 acre	800 feet
Parcels zoned for 1 acre to 4.99 acres	1,320 feet
Parcels zoned for 5 acres to 19.99 acres	2,640 feet
Parcels zoned for 20 acres or larger	5,280 feet

These requirements may be modified when in the opinion of the Chief condition warrant. All lengths shall be measured from the edge of the roadway surface at the intersection that begins the road to the end of the road surface at its farthest point. Where a dead-end road crosses areas of differing zoned parcel sizes, requiring different length limits, the shortest allowable length shall apply.

Secondary access must be remote from the primary access, and must meet all provisions of this Section.

5.2.1.2 Applied Standards

It is the intent of this requirement to provide emergency access that is safe and separate from the primary access and provides a reliable alternative means of egress for residents during a fire event. Except as provided below, all discretionary projects shall provide a second route of access when the above distance thresholds are exceeded. The request for exception to secondary access requirements must demonstrate the same overall practical effect as the regulation, and must address topographic, geological, and environmental conditions which make meeting the regulation unattainable.

- Primary Road is Significantly Improved. The primary road that is used to access the project is improved in order to provide sufficient access to the project during a fire, which results in the same practical effect.
- Secondary Access can be Provided, but Cannot Meet Road Standards. Where it is impossible to provide secondary access in full compliance with the County Fire Code (including width, grade, turning radius, and similar constraints), the County may consider slight deviations from the minimums identified in the standards if the deviations provide the same practical effect.
- Shelter-in-Place Strategy. In the event secondary access for a new proposed community or institution (e.g. school) is unattainable due to topographical or geographical constraints, a Shelter-in-Place design strategy may be considered for the proposed project. **Shelter-in-Place is a last resort design concept with relocation (evacuation) of residents to a safe location being the preferred action.** The following minimum design standards must be implemented in order to qualify for consideration of a Shelter-in-Place concept. Additional standards, or modification to the standards below, may be required by the FAHJ or the Director of Planning and Land Use in order to achieve a same practical effect.
 - The primary access roadway must meet minimum fire code requirements (in terms of width, paving, posting, etc.), and have no potential constraints or bottlenecks on or off-site until it reaches two directions of egress from the area;
 - All structures within the entire proposed project, regardless of distance to property line or WUI area, must be built using Enhanced Ignition Resistant Construction (County Fire and Building Codes);
 - The project must be designed with adequate and properly managed Fuel Modification Zones which may be as much as four times the calculated flame length, and properly maintained ornamental landscaping consistent with the County's "Fire, Defensible Space and You..." (County of San Diego 2004; Internet link: [County of San Diego - Dept. of Planning and Land Use - Fire, Defensible Space and You ...](#)). A funding mechanism must be implemented to ensure fire agency enforcement staffing in perpetuity;
 - The developer provides evidence that resources exist to adequately and consistently enforce weed abatement regulations for the life of the project (a funding mechanism must be implemented to ensure fire agency enforcement staffing in perpetuity);
 - The developer provides evidence that resources exist to provide substantial and effective annual public outreach to educate

residents on fire safety and emergency response for the life of the project (a funding mechanism must be implemented to ensure fire agency public education staffing in perpetuity);

- The extent to which any flammable vegetation/habitat areas is proposed within a shelter-in-place development must be carefully studied and evaluated as part of the FPP; and,
- The primary access road must have adequate vegetation clearance that may be as much as twice the calculated flame length.

5.2.2 Road Width

5.2.2.1 Applicable Code/Regulations

Public/Private Road Standards and County Fire Code, Section 902.2.2.1

Access roads shall be improved a minimum of 24 feet, except for driveways serving no more than two dwellings, shall have a minimum of 16 feet of improved width. Exception: Upon approval by the Fire Chief, the minimum width may be reduced, provided that the reduction does not impair access by fire apparatus.

5.2.2.2 Applied Standards

An exception to the standard requirement may be allowed for a short section where extreme topographic constraints make it impossible to obtain the minimum required width in the opinion of the Director of Public Works and FAHJ because of extreme topographic constraints.

5.2.3 Grade

5.2.3.1 Applicable Code/Regulations

County Fire Code Section 902.2.2.6

The gradient for a fire apparatus access roadway shall not exceed 20.0%. Grades exceeding 15.0% (incline or decline) shall not be permitted without mitigation. Minimal mitigation shall be the installation of fire sprinkler systems or a surface of Portland cement concrete (PCC), with a deep broom finish, perpendicular to the direction of travel to enhance traction. The Chief may require additional mitigation measures where he deems appropriate. The angle of departure and angle of approach of a fire access roadway shall not exceed seven degrees (12%) or as approved by the Chief.

5.2.3.2 Applied Standards

The maximum grade allowed by CCR T-14 section 1273.03 is 16% without mitigation. The regulation allows for exceptions at section 1270.07 where the exception provides the same overall practical effect as the regulation. Fire sprinkler systems, required by the code for all wildland areas, act as a mitigating factor.

Exceptions would be considered where full compliance with the standard could not be achieved because of extremely steep terrain. Example of exception might include a short (e.g. 100 feet) section of no more than 20% grade, permitted where the road is relatively straight before, during and after the exception, line-of-sight is maintained, and fire engine speed can be expected to be maintained. It should be noted that the grade requirement is based on the potential for fire hose or other equipment to be spilled out of the engine because of extremes in grade.

5.2.4 Surface Type

5.2.4.1 Applicable Code/Regulations

County Fire Code Sec. 902.2.2.2. and Sec. 902.2.2.2.2 SURFACE.

Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (not less than 50,000 lbs.) and shall be provided with an approved surface so as to provide all-weather driving capabilities.

For driveways serving individual single-family dwellings the minimum surfacing materials required shall vary with the slope of the fire apparatus access road as follows:

0-10% Slope	4" Decomposed Granite
11-14% Slope	2" Asphaltic Concrete
15-20% Slope	3" Asphaltic Concrete

The paving and sub-base shall be installed to the standards specified in Section I-M of the County of San Diego Off-street Parking Design Manual. (<http://www.co.san-diego.ca.us/cnty/cntydepts/landuse/planning/zoning/ospdman.pdf>).

A residential driveway constructed of 3½" Portland cement concrete may be installed on any slope up to 20% provided slopes over 15% have a deep broom finish perpendicular to the direction of travel to enhance traction.

5.2.4.2 Applied Standards

Full compliance with the code

5.3 **Water**

Providing adequate water supply, volume and pressure, is crucial in fighting not only wildland fires, but smaller scale residential fires as well. History has shown that most fire related responses are to residential fires. In some cases, however, residential fires escape the confines of the house and become wildfires. As such, it is important that water resources are adequate to meet the volume and flow needs to properly fight fires either at an individual home or the surrounding neighborhood.

5.3.1 **Inside Water District**

5.3.1.1 Applicable Code/Regulations

Sec. 903.4.2.1. Waterline Extensions (<http://www.co.san-diego.ca.us/dplu/docs/firecode.pdf>)

The Chief may require a waterline extension for the purpose of installing a fire hydrant if the water main is 1,500 feet or more from the property line.

Sec. 903.4.2.2. Fire Flow Requirements (<http://www.co.san-diego.ca.us/dplu/docs/firecode.pdf>)

Fire flows shall be based on Fire Code Appendix III-A. Consideration should be given to increasing the gallons per minute set forth in Appendix III-A to protect structures of extremely large square footage and for such reasons as: poor access roads; grade and canyon rims; hazardous brush; and response times greater than five minutes by a recognized fire department or fire suppression company.

In hazardous fire areas as defined in Fire Code Appendix II-A, the main capacity for new subdivisions shall not be less than 2,500 gallons per minute, unless otherwise approved by the chief.

If fire flow increases are not feasible, the Fire Chief may require alternative design standards such as: alternative types of construction providing a higher level of fire resistance; fuel break requirements which could include required irrigation; modified access road requirements; specified setback distances for building sites addressing canyon rim developments and hazardous brush areas; and other requirements authorized by this Code and as specified by the Fire Chief.

5.3.1.2 Applied Standards

Full compliance with the code (Exceptions identified in the code text)

5.3.2 Outside Water District

5.3.2.1 Applicable Code/Regulations

Sec. 903.3.2. Water Storage Tanks (<http://www.co.san-diego.ca.us/dplu/docs/firecode.pdf>)

Water storage tanks, when permitted by the Chief, shall comply with Table 2, Water Storage Tank Requirements.

Table 2
Water Storage Tank Requirements

Building Square Feet	Gallons Per Minute Water Flow	Capacity Gallons	Duration Minutes
Up to 1,500	250	5,000	20
Over 1,500	250	10,000	40
When exposure distance is one hundred feet (100') or less from adjacent property, increase in water storage may be required by the Chief, depending on the square footage of the exposed structure. When protecting exposures within 100 feet or less, the minimum flow duration shall not be less than two (2) hours unless otherwise approved by the Chief.			

- Tank elevation shall be equal to or higher than the fire department connection on the premises. Regardless of domestic use, all tanks shall be equipped with a device that will ensure that the tank contains the designated amount of water for fire flow duration as determined by the fire department. Tank size may be increased to serve multiple structures on a single parcel.
- Supply outlet shall be at least 4 inches in diameter from the base of the tank to the point of outlet at the fire department connection. The fire department connection shall be at least one 4-inch National Standard Thread (male), reduce to one 2 ½ inch National Standard Thread (Male). Additional outlets may be required.
- Location of fire department outlet to be determined on the plot plan when submitted to the fire department. Consideration will be given to topography, elevations, and distance from structures, driveway access, prevailing winds, etc.
- The outlet shall be located along an access roadway and shall not be closer than 50 feet nor further than 150 feet from the structure.
- All exposed tank supply pipes shall be of an alloy or other material listed for above ground use. Adequate support shall be provided.

- Water storage tanks shall be constructed from materials approved by the Fire Marshal and installed per manufacturer recommendations.
- The Chief may require any necessary information to be submitted on a plot plan for approval.
- Vessels previously used for products other than water shall not be permitted.

5.3.2.2 Applied Standards

Full compliance with the code. Note that structures or clusters of structures substantially greater than roughly 5,000 square feet will be required to provide additional storage. In certain cases, the FAHJ or the Director of Planning and Land Use may require the creation of a small private water company to provide adequate fire suppression service for the life of the proposed project.

5.4 **Ignition Resistive Building Construction and Fire Protection Systems**

Following the October 2003 wildfires, assessments were made of damaged and destroyed homes in an effort to identify areas where building codes could be strengthened in order to enhance the chances of a structure surviving a wildfire. As a result, in June 2004, the County amended the Fire Code and Building Code to include two-tiered ignition-resistive construction requirements (basic and enhanced) for all new construction.

5.4.1 **Basic Ignition-Resistant Construction**

5.4.1.1 Applicable Code/Regulations

Fire Code (Chapter 3 of Division 5 of Title 3 of the San Diego County Code of Regulatory Ordinances) and County Building Code (Title 5, Section 51.0001 et al).

Under this system, new structures located in the WUI must be built using basic ignition-resistive construction methods including, but not limited to, Class A Roofing, ignition resistant exterior walls, dual glazed windows, and attic and foundation venting that is located in a manner that inhibits embers from getting into the building.

5.4.1.2 Applied Standards

Full compliance with the code/regulations

5.4.2 Enhanced Ignition Resistant Construction

5.4.2.1 Applicable Code/Regulations

Fire Code (Chapter 3 of Division 5 of Title 3 of the San Diego County Code of Regulatory Ordinances) and County Building Code (Title 5, Section 51.0001 et al)

All structures with one or more of the following special hazards or conditions must be built using enhanced ignition-resistive construction methods:

- 1) High fuel loads;
- 2) Steep topographic conditions;
- 3) Less than 100 feet of fuel modification (with the exception of Rancho Santa Fe, which requires that ALL structures comply with Enhanced Fire Resistive Construction); or,
- 4) Areas identified as high to very high fire hazard areas per local fire agencies or under the Bates Bill.

The enhanced ignition-resistive construction system includes, but is not limited to, all requirements under Basic Fire Resistant Construction system, tempered glass skylights, metal rain gutters, more stringent ignition resistant eave construction, stricter venting requirements, solid-core or non-combustible exterior doors, and prohibitions against combustible attachments/projections such as fences and patio covers.

5.4.2.2 Applied Standards

Full compliance with the code/regulations

5.5 Defensible Space, Ornamental Landscaping and Vegetation Management

History has shown through structural losses experienced in the Cedar, Paradise, Otay, Harmony, Viejas, Gavilan and Pines Fires that defensible space is a critical factor of structure survival. By ensuring defensible space around structures, fire fighting teams are provided a line of defense to protect homes and other valued assets at risk of wildland fires. In February 2004, the Board of Supervisors adopted amendments to the County's Combustible Vegetation and Other Flammable Materials Ordinance (Weed Abatement Ordinance) in an effort to reduce the build-up of combustible vegetation and require adequate fuel modification from structures.

5.5.1 Fuel Modification

5.5.1.1 Applicable Code/Regulations

Title 4 of Division 8 of Title 6 of the San Diego County Code, Section 68.404 – Prohibitions/Clearance Requirements.

A mandatory minimum of 100 feet of fuel modifications from all structures is required. The Director of Planning and Land Use may authorize a distance less than 100 feet, but no less than 30 feet.

5.5.1.2 Applied Standards

Projects located in a Hazardous Fire Area shall include Fuel Management Zones (FMZ) surrounding all structures that are greater than 250 square feet in size. An FMZ is a 100-foot area surrounding and extending in all directions from all structures, in which all flammable vegetation or other combustible growth is cleared away or modified, except for:

- Single specimens of trees or other vegetation that are well-pruned and maintained so as to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation to any structure; and,
- Grass and other vegetation located more than 50 feet from the structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.

All ornamental landscaping shall be consistent with County's "Fire, Defensible Space and You..." (County of San Diego 2004; Internet link: [County of San Diego - Dept. of Planning and Land Use - Fire, Defensible Space and You ...](#)). Projects requiring landscape plans must clearly identify the type of plant materials, locations and spacing of plant materials, and irrigated and non-irrigated landscaping. The landscape consultant may recommend in the text the inclusion or exclusion of specific varieties for review by the County landscape architect.

Maintenance requirements and suggestions for landscaping in FMZs is provided in:

- The Consolidated Fire Code (<http://www.sdcounty.ca.gov/dplu/docs/firecode.pdf>);
- "Fire, Defensible Space and You..." ([County of San Diego - Dept. of Planning and Land Use - Fire, Defensible Space and You ...](#));
- "Fire-safe Landscaping Can Save your Home" (<http://www.sdcounty.ca.gov/oes/docs/fswy12.pdf>); and
- The California Native Plant Society's "Native Plant Landscaping to Reduce Wildfire Risk" (<http://www.cnpssd.org/fire/ReduceFireRisk.pdf>).

However, the Director of Planning and Land Use may accept the following as sufficient mitigation measures and allow for a reduction in the FMZ.

- 1) The FMZ shall normally be accommodated within the boundaries of the project. However, where it is determined that practical difficulties make it infeasible to do that, offsite areas may be included, provided that offsite fuel modification is assured by an enforceable easement from the neighboring property owner or another legally enforceable mechanism.
- 2) Normally the FMZ will be provided by surrounding the building area. However, it may be acceptable to approve locating the FMZ so as to surround the development area.
- 3) Any project that is required to prepare and implement a full FPP may also be required to prepare a **Fire Model** that evaluates a worst-case scenario wildfire event based on site topography, weather and vegetation. The modeling, combined with the consultant/fire authority's expertise may result in the consultant proposing greater or lesser buffers to minimize building and occupant safety risks. Under no circumstances shall the FMZ of less than 30 feet be approved.

6.0 REFERENCES CITED AND/OR CONSULTED

- American Planning Association. Zoning News - Saving Homes from Wildfires: Regulating the Home Ignition Zone, May 2001.
- Australasian Fire Authorities Council. Position paper on bushfires and community safety. November 2005.
- Brooks, M. and C.M. D'Antonio. The role of fire in promoting plant invasions. In: M. Kelly (ed.), Proceedings of the California Exotic Pest Plant Council Symposium. Vol. 6:29-30. 2003.
- Brooks, M.L., C.M. D'Antonio, D.M. Richardson, J.B. Grace, J.E. Keeley, J.M. DiTomaso, R.J. Hobbs, M. Pellant, and D. Pyke. Effects of Invasive Alien Plants on Fire Regimes. *BioScience* 54(7): 677-688. 2004.
- Brown, T.J. The application and utilization of climate information for fire management and policy. In: Proceedings of the 3rd International Wildland Fire Conference, Sydney, Australia. October 2003.
- Brown, T.
- The application and utilization of climate information for fire management and policy. In Proceedings of the 3rd International Wildland Fire Conference. October 2003.
- The impact of twenty-first century climate change on wildland fire in California. California Climate Watch, Pp. 1-2, August 2004.
- Brown, T.J., B.L. Hall and A.L. Westerling. The impact of twenty-first century climate change on wildland fire danger in the western United States: an applications perspective. *Climatic Change* 62:365-288. 2004.
- Burn Institute, Fire Safe San Diego County, San Diego County Fire Chiefs Association, County of San Diego Board of Supervisors. A Guide for the Homeowner: Living with Wildfire. San Diego Union Tribune, May 20, 2001.
- Butler, C.P. The urban/wildland fire interface. In: Proceedings of Western States Section/Combustion Institute Papers, Vol. 74, No. 15. May 6-7, 1974; Spokane, WA. Pullman, WA: Washington State University; 1-17. 1974
- California Code of Regulations. Guidelines for Implementation of CEQA, Appendix G, Title 14, Chapter 3, §15000-15387, 2004.
- California Department of Forestry and Fire Protection. Fire Safe Guides for Residential Development in California, 1993.
- California Office of the State Fire Marshall. California Laws Relating To Fires and Firefighters. Available at <http://osfm.fire.ca.gov/>.
- California Public Resources Code. California Environmental Quality Act (PRC §21000-21178), 2004
- California Building Standards Code. California Code of Regulations, Title 24, Parts 1-12, Building Code, Electrical Code, Mechanical Code, Plumbing Code, Energy Code, Elevator Safety Construction Code, Historical Building, Fire Code, Code for Building Conservation, Referenced Standards Codes. Available at <http://osfm.fire.ca.gov/>.
- California Native Plant Society's Native Plant Landscaping to Reduce Wildfire Risk <http://www.cnpsd.org/fire/ReduceFireRisk.pdf>, accessed March 12, 2007.
- Cohen, J.
- Preventing Disaster: Home Ignitability in the Wildland-Urban Interface, *Journal of Forestry*, Vol. 57, No. 4, 1997.
- Rocky Mountain Research Station, Fire Sciences Laboratory. Reducing the Wildland Fire Threat to Homes: Where and How Much? General Technical Report, PSW-GTR-173, pp. 189-195, 1999.
- USDA Forest Service, Southeastern Forest Experiment Station. A Site-Specific Approach for Assessing the Fire Risk to Structure at the Wildland-Urban Interface, General Technical Report, SE-GTR-69, pp. 252-256, 1991.
- Wildland-urban fire – a different approach. USDA Forest Service, Fire Sciences Laboratory. www.firelab.org, accessed April 11, 2006.

- Cohen, J and BW. Butler Intermountain Fire Sciences Laboratory, Modeling Potential Structure Ignitions from Flame Radiation Exposure with Implications for Wildland/Urban Interface Fire Management. In Proceedings of the 13th Conference on Fire and Forest Meteorology, Fairfield, WA. International Association of Wildland Fire, 1998.
- Cohen, J. and J. Saveland. Structure Ignition Assessment Can Help Reduce Fire Damages in the W-UI. Fire Management Notes, Vol. 57, No. 4, pp. 19-23, 1997.
- Cave, T.J. Public Safety in the Urban-Wildland Interface: Should Fire-Prone Communities Have a Maximum Occupancy? Natural Hazards Review – ASCE (American Society of Civil Engineers). Pp. 99-108. August 2005.
- County of San Diego
- Consolidated Fire Code. County Health and Safety Code §13869.7.
- County of San Diego Standards for Private Roads.” Department of Public Works. Adopted June 30, 1999.
- Fire, Defensible Space and You. 2004.
- Fire Prevention Measures to Provide Defensible Space in the Unincorporated Area of the County. Board of Supervisors, Land Use Agenda Item, May 15, 2002.
- General Plan, Part VII Public Safety Element, 1975.
- Plant List and Acceptable Plants for a Defensible Space in Fire Prone Areas. Department of Planning and Land Use, December 15, 1998.
- Weed and Rubbish Abatement Ordinance, San Diego County Code of Regulatory Ordinances, Title 6 Health and Sanitation, Division 8 Sewage and Refuse Disposal, Chapter 4 Abatement of Weeds and Rubbish.
- Cova, T.J. Public Safety in the Urban-Wildland Interface: Should Fire-Prone Communities Have a Maximum Occupancy? Natural Hazards Review – ASCE (American Society of Civil Engineers). Pp. 99-108. August 2005.
- Dombeck, M.P., J.E. Williams, and C.A. Wood. Wildfire policy and public lands: integrating scientific understanding with social concerns across landscapes. Conservation Biology 18(4): 883-889, 2004.
- Franklin, S.E. Sheltering in place: surviving catastrophic wildfire. American Fire Journal 365:12-13. 1998.
- Fule, P.Z., J.E. Crouse, T.A. Heinlein, M.M. Moore, W.W. Covington, and G. Verkamp. Mixed-severity fire regime in a high-elevation forest of the Grand Canyon, Arizona, USA. Landscape Ecology 18:465-486. 2003.
- Gill, S. ARI Final Report: Fire history, forest structure and early land uses in a Jeffrey pine-mixed conifer forest under an unmanaged fire regime. 2002.
- Grossan, M. Wildfire/Brushfire Smoke Health Problems. <http://www.ent-consult.com/wildfires.html> , accessed March 13, 2007.
- Halsey, R.W. Fire, Chaparral, and Survival in Southern California. Sunbelt Publications. 2005.
- International Association of Fire Chiefs (IAFC) and Western Fire Chiefs Association (WFCFA). Development Strategies in the Wildland/Urban Interface, 1996.
- International Code Council. International Urban-Wildland Interface Code. 2003.
- Keeley, J.E. Fire Management of California shrubland landscapes. Environmental Management 29(3):395-408. 2002.
- Impact of antecedent climate on fire regimes in coastal California. International Journal of Wildland Fire 13:173-182. 2004
- Keeley, J.E. and C.J. Fotheringham.
- The historical role of fire in California shrublands. Conservation Biology 15:1536-1548. 2001.
- History and management of crown-fire ecosystems: a summary and response. Conservation Biology 15(6):1561-1567. 2001.
- Impact of past, present, and future fire regimes on North American Mediterranean shrublands. In: T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam (eds). Fire and Climatic Change in Temperate

- Ecosystems of the Western Americas. Springer, New York. 2003.
- Keeley, J.E., C.J. Fotheringham, and M. Morais. Reexamining fire suppression impacts on brushland fire regimes. *Science* 284:1829-1832. 1999.
- Lessons from the October 2003 wildfires in southern California. *Journal of Forestry*. October/November 2004.
- Lenihan, J.M., R. Drapek, R. Neilson. Climate change effects on vegetation distribution, carbon, and fire in California. *Ecological Applications* 13(6):1667-1681. 2003.
- Lindroth, R. Community defense from wildfire, an international comparison. *Poudre Fire Authority*. Ft. Collins, Colorado. February 2005.
- Llorett, F. M. Verdú, N.Flores-Hernández, and A.V. Valiente-Banuet. Fire and resprouting in Mediterranean ecosystems: Insights from an external biogeographical region, the Mexical shrubland. *Am. J. Botany* 86(12):1655-1661. 1999.
- Menakis, J.P., D. Osborne, and M. Miller. Mapping the cheatgrass-caused departure from historical natural fire regimes in the Great Basin, USA. *USDA Forest Service Proceedings RMRS-P-29*. Pp. 281-287. 2003.
- Minnich R.A., M.G. Barbour, J.H. Burk, and R.F. Fernau. Sixty years of change in Californian conifer forests of the San Bernardino Mountains. *Conservation Biology* 9(4):902-914.
- Minnich R.A., M.G. Barbour, J.H. Burk, and J.Sosa-Ramirez. Californian mixed-conifer forests under unmanaged fire regimes in the Sierra San Pedro Martir, Baja California, Mexico. *J. Biogeography* 27:105-129. 2000.
- Mitchell, J.W. Brand Dilution. *Wildfire Magazine*. March/April 2005.
- Moreno, J.M. and W.C. Oechel. Fire intensity effects on germination of shrubs and herbs in southern California chaparral. *Ecology* 72(6):1993-2004. 1991.
- Moritz, M.A. Analyzing extreme disturbance events: fire in Los Padres National Forest. *Ecological Applications* 7(4):1252-1262. 1997.
- National Interagency Fire Center. *Wildland Fire Statistics*. Boise, ID, 2000.
- Nave, R. Inverse square law – radiation. <http://hyperphysics.phy-astr.gsu.edu/hbase/forces/isq.html>, accessed March 13, 2007.
- NewsNet5. Protect Your Lungs From Wildfire Smoke. <http://www.newsnet5.com/health/2592720/detail.html> 2003.
- Nicholson, J. Mass evacuation: is total evacuation of a community threatened by wildfire a sound strategy. Paper presented to the Institution of Fire Engineers, New South Wales Branch, 1994 State Conference, Sydney, Australia. 1994.
- Purcell, K.L. and S.L. Stephens. Changing fire regimes and the avifauna of California oak woodlands. *Studies in Avian Biology* 30:33-45.
- Radeloff, V.C., R.B. Hammer, S.I. Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. The wildland-urban interface in the United States. *Ecological Applications* 15(3):799-805. 2005.
- Ramsay, G.C., N.A. McArthur, and V.P. Dowling. Preliminary results from an examination of house survival in the 16 February 1983 bushfires in Australia. *Fire and Materials* 11(1):49-51. 1987.
- Rancho Santa Fe Fire Protection District. *Sheltering in Place during Wildfires*. 2004.
- Skinner, C.N. and C. Chang. Fire regimes, past and present. *Sierra Nevada Ecosystem Project: Final report to Congress, vol.II, Assessments and scientific bases for management options*. Davis: University of California, Centers for Water and Wildland Resources 1996.
- Skinner, C., S. Stephens, and R. Everett. Final report: fire regimes of forests in the Peninsular and Transverse Ranges of southern California. *Joint Fire Science Program Project 01B-3-3-18*. U.C. Berkeley. December 2006.
- Southern California Society of American Foresters. *Bark Beetle Info*. www.socalsaf.org accessed March 5, 2007.

Therriault, S. Wildfire Smoke – A Guide For Public Health Officials.

<http://www.deq.state.mt.us/FireUpdates/WildfireSmokeGuide.pdf>, accessed March 13, 2007.

Uniform Fire Code 2000 edition published by the Western Fire Chiefs Association and the International Conference of Building Officials, and the National Fire Protection Association Standards 13 & 13-D, 2002 Edition, and 13-R, 2002 Edition. Available at <http://www.buildersbooksite.com/codes400.htm>

United States Code.

National Environmental Policy Act (42 USC §4321), 1969. National Environmental Policy Act as amended [Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982.

United States Department of Agriculture, United States Forest Service, Fire Triangle.

United States Fish and Wildlife Service. Memorandum of Understanding. Agreement Between United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), California Department of Forestry and Fire Protection (CDF), San Diego County Fire Chief's Association and the Fire District's Association of San Diego County.

United States Geological Survey.

USGS study casts doubt on role of fire suppression in causing catastrophic shrubland wildfires. Western Ecological

Research Center News Release. June 10, 1999.

USGS studies wildfire ecology in the western United States. Western Ecological Research Center News Release. September 17, 1999.

What wildfire research tells us about fire risk in California. Western Ecological Research Center Media Advisory. October 9, 2001.

Testing a basic assumption of shrubland fire management: How important is fuel age? Western Ecological Research Center Publication Brief for Resource Managers. March 2004.

Ventura County Fire Protection District. Fire Management Plan. July 2005.

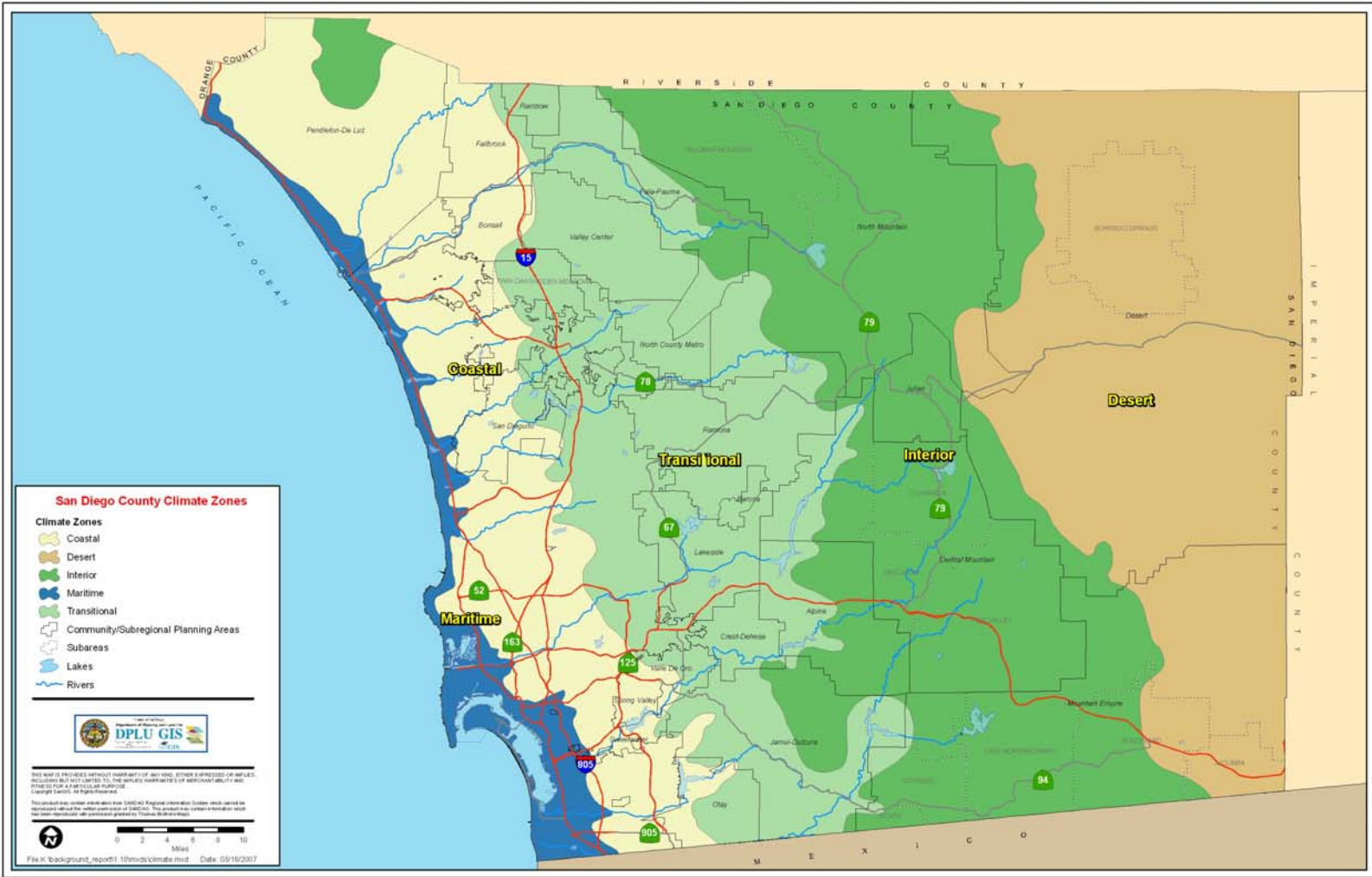
Verdú, M. Ecological and evolutionary differences between Mediterranean seeders and resprouters. *J. Vegetation Science* 11:265-268. 2000.

Wells, M.L., J.F. O'Leary, J. Franklin, J. Michaelsen, and D.E. McKinsey. Variations in a regional fire regime related to vegetation type in San Diego County, California (USA). *Landscape Ecology* 19(2):139-152. 2004.

Wildland Fire Task Force, Mitigation Strategies for Reducing Wildland Fire Risks, San Diego County Wildland Fire Task Force Findings and Recommendations, Report to the Board of Supervisors, August 13, 2003.

Zedler, P.H. and L.A. Seiger. Age mosaics and fire size in chaparral: a simulation study. In: Keeley, J.E., M. Baer-Keeley, and C.J. Fotheringham (eds.) *2nd Interface Between Ecology and Land Development in California*. U.S. Geological Survey Open-File Report 00-62. 2000.

Figure 1
Climate Zones in San Diego County



[ATTACHMENT A]

DEFINITIONS

Defensible space – An area either natural or man-made, where material capable of allowing a fire spread unchecked has been treated, cleared or modified to slow the rate and intensity of advancing wildfire. This will create an area for increased safety for emergency fire equipment and evacuating or sheltering civilians in place and a point for fire suppression to occur.

Fire authority having jurisdiction (FAHJ) – The designated entity providing enforcement of fire regulations as they relate to planning, construction and development. This entity may also provide fire suppression and other emergency services..

Fuel modification zone – A strip of land where combustible vegetation has been thinned, modified or both and partially or totally replaced with approved drought-tolerant, fire-resistant and/or irrigated plants to provide an acceptable level of risk from vegetation fires. Fuel modification reduces radiant and convective heat, thereby reducing the amount of heat exposure on the roadway or structure and providing fire suppression forces a safer area in which to take action.

Hazardous fire area – Any geographic area mapped by the State or local jurisdiction

as a high, or very high fire hazard area, or as set forth by the FAHJ that contains the type and condition of vegetation, topography, weather, and structure density to potentially increase the possibility of vegetation conflagration fires shall be considered a hazardous fire area.

Structure – A residence and attached garage, building or related facility that is designed primarily for human habitation or buildings designed specifically to house farm animals. Decking, fences, and similar facilities are not considered structures for the purposes of establishing the limits of the fuel modification zone. Sheds, gazebos, and detached garages less than 250 square feet which are located within the fuel modification zone, shall be designed, constructed and placed such that they do not require the fuel modification zone to be increased beyond that required for the primary structures on the property.

Wildland fuel – Any timber, brush, grass, or other flammable vegetation, living or dead, standing or down, that is not classified as ignition-resistive.

Wildland-urban interface – the area where structures and other human developments meet or intermingle with undeveloped wildland.